

UNITED STATES PATENT OFFICE.

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GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 671,448, dated April 9, 1901.

Application filed March 12, 1898. Serial No. 673,657. (No model.)

To all whom it may concern:

Be it known that I, ALBERT H. MORTON, a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Grinding-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to machines for finishing the surface of metallic objects circular in cross-section, and particularly to grinding-machines for dressing and finishing the surface of a shaft or rod and imparting thereto a truly cylindrical shape in cross-section.

In the operation of grinding a shaft or other cylindrical bar of iron or steel the bar is placed between centers upon a suitable carriage, which carriage is caused to travel along past a suitable grinding-disk, of emery or other suitable material, which is revolved at a high speed with its periphery in contact with the surface of the shaft or bar, which at the same time is caused to revolve usually at a slower speed than the grinding-disk and in the opposite direction, whereby the surface of the shaft or bar will be brought to a finished state. By means of suitable adjusting devices the relative positions of the periphery of the grinding-disk and the shaft or bar to be ground are controlled according to the amount of stock which it is desired to remove from the shaft or bar; but in practice where the shaft or bar acted upon is of any considerable length it has been practically impossible to secure uniform action of the grinding-disk on the shaft or bar throughout the entire length for the reason that the rapid action of the grinding-disk upon the shaft or bar will cause it to "chatter," as it is termed, or vibrate, such vibration increasing as the central portion of the shaft or bar is brought under the action of the grinding-disk. This vibratory action of the shaft or bar results in an imperfect product, the surface of which instead of being smooth and truly cylindrical will be roughened or "chattered," as it is termed.

It has been demonstrated by experiment that if the shaft or other object to be ground and the grinding-disk be adjusted so that the

periphery of the disk will just touch the surface of the shaft or other object and the disk rapidly revolved the shaft will be drawn toward the disk downward and inward by the frictional contact of the surfaces to such an extent that a cut of considerable depth will be made in the surface of the shaft or other object caused by the continuous chattering action between the disk and shaft.

Prior to the present invention it has been the practice to provide a grinding-machine of the type referred to with a rest or brace to support the shaft upon the side opposite the grinding-disk for the purpose of preventing the shaft from springing away from the grinding-disk; but this device has been found insufficient to prevent the chattering of the shaft, and in an attempt to reduce the chattering to a minimum it has been the practice to adjust the grinding-disk to have but little contact with the shaft to be ground. In other words, the grinding capacity of the disk or its cutting action is reduced in the attempt to reduce the chattering. In the present invention, however, the grinding-disk can be adjusted to cut or grind to its full cutting or grinding capacity and the chattering of the shaft or bar entirely prevented.

The object of the present invention is to improve the operation of grinding-machines of the type mentioned and to insure that the shaft or other object to be ground shall have a smooth and truly cylindrical surface.

To the above end the present invention consists of the devices and combination of devices, which will be hereinafter described and claimed.

The present invention is illustrated in the accompanying drawings, wherein is also illustrated one form of a device which is now in use on grinding-machines in an attempt to prevent the vibration of the object being ground.

Figure 1 shows in side elevation and partial section portions of a grinding-machine of a type that is well known, provided with the usual brace or rest in contact with the bar or shaft at the side opposite to the point of contact of the grinding-disk, which is designed to prevent the vibration of the shaft as it is acted upon by the disk and hold it up to the grinding-disk. Fig. 2 illustrates the same machine with the present invention applied

thereto. Fig. 3 illustrates the same machine with the present invention employed in connection with the usual brace or support.

Similar letters of reference designate corresponding parts throughout the several views.

In the drawings, A represents the bed or frame of the machine, upon which is a suitable guideway a , supporting a traveling carriage a' , which carries suitable standards a^2 , (one only being shown,) in which are suitable centers (not shown) which support the shaft S or other object to be ground, the carriage a' being caused to travel slowly along the guideway a and the shaft S revolved on the centers by any suitable or usual means.

B represents the grinding-disk, of emery or other suitable material, mounted upon a rotary shaft b in suitable bearings in stands b' , (one only being shown,) which are projected vertically and forwardly from a carriage b^2 , which is adjustable along a guideway b^3 on the bed or frame A, the shaft b being rapidly revolved and the carriage b^2 adjusted by any usual or suitable means in order that the grinding-disk B may act upon the surface of the shaft or other object S and that its periphery may be positioned relatively to the shaft S according to the depth of the cut desired.

In operation the grinding-disk B is rapidly revolved and the shaft S to be ground slowly revolved, usually in opposite directions, and as the grinding progresses the carriage b^2 is caused to slowly travel along in order that all parts of the surface of the shaft S may be brought under the action of the grinding-disk.

As shown in Fig. 1 of the drawings, the machine as heretofore constructed has been provided with a brace or rest D, comprising a block of wood or other suitable material d , which is adjustably seated in a recess d' in a head d^2 of a standard d^3 , secured by a bolt d^4 or other suitable means in a fixed position upon the bed or frame A.

The brace or rest D has usually been arranged, as shown in Fig. 1, in position to bear upon the shaft S upon the side opposite to the grinding-disk B, the object being, as before stated, to prevent the shaft S from springing away from the periphery of the disk B. In practice, however, it has been found that while this will prevent the shaft from springing away from the grinding-disk it will not prevent the shaft S from being drawn in the other way, or toward the disk, and by actual experiment and practical use of the present invention it has been demonstrated that there is not so much necessity of holding the work up to the periphery of the grinding-disk as there is in preventing the work from being drawn too far in the direction of the periphery of said disk, or, in other words, to prevent the vibration of the work from causing it to spring and strike the periphery of the disk a series of blows as the grinding progresses and to provide a brace or rest which

will bear against the shaft S or other object being ground upon the same side with the grinding-disk, and thus while steadying the work limit the extent to which the disk may cut into its surface. Therefore, as shown in Fig. 2 of the drawings, the machine is shown as having the brace or rest D removed and as being provided with a brace or rest E, which may be the same in construction as the rest D and supported in any suitable or convenient manner in a fixed position upon the machine to bear upon the shaft S upon the same side as the grinding-disk B, adjacent thereto, and to the point of contact of the periphery of the disk and the work.

In the drawings the brace E is shown as being carried by the upturned end e of an arm e' , which is adjustably secured by means of a bolt e^2 and slot e^3 to the sides of one of the standards b' . By properly adjusting the brace E horizontally with relation to the periphery of the grinding-disk B the grinding action of the disk is effectually controlled, and by experiment and test it has been demonstrated that a perfect shaft having a uniform smooth surface free of chatter throughout its entire length is produced.

By placing the brace or rest upon the same side of the shaft or other object being ground as the disk B, no matter how much the shaft may spring away from the disk B the distance to which it can return toward the disk is limited and absolutely controlled, so that the cutting action thereof will be uniform.

In case of grinding rods of small diameter it may be desirable to employ the present invention in connection with a brace upon the outer side, and, as shown in Fig. 3, this may be accomplished by providing a standard G with a forked upper end g , which carries two guides or rests g' , whereby the rod will be prevented from springing away from or toward the grinding-disk.

The operation of the present invention has been sufficiently described in connection with the foregoing description of the construction and arrangement, and further description is deemed unnecessary.

Having described the construction and mode of operation of my invention, I claim as new and desire to protect by Letters Patent of the United States—

In a grinding-machine, the combination with a grinding-disk, of a brace or rest held in a fixed position adjacent to said disk, and arranged to bear upon the surface of the object being ground, upon the same side with the grinding-disk, and supports for the object arranged on opposite sides of the grinding-disk and brace substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT H. MORTON.

Witnesses:

T. HART ANDERSON,
A. E. WHYTE,